



PCT/GB2003/003315



INVESTOR IN PEOPLE

PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

30 SEP 2003

WIPO

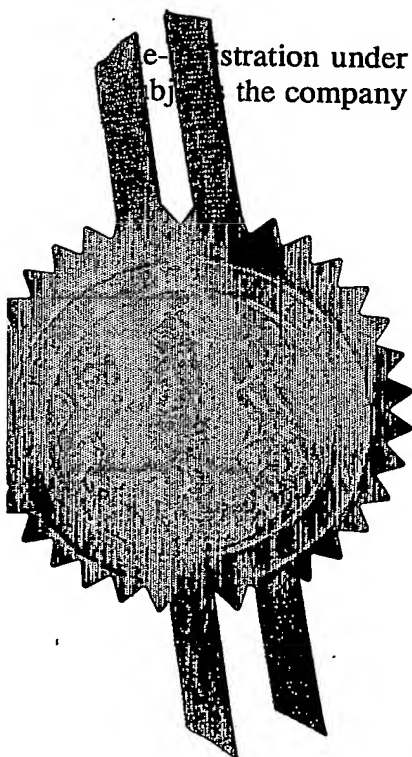
PCT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

e-
b) registration under the Companies Act does not constitute a new legal entity but merely the company to certain additional company law rules.



Signed *AmBrewer*

Dated 10 September 2003

BEST AVAILABLE COPY

Patent 1977
(Rule)



THE PATENT OFFICE

C

16 JUN 2003

NEWPORT

16JUN03 E815064-4 000239
POL/7700 0:00-0363793.2

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference

DM/KG/P12866GB

2. Patent application number

(The Patent Office will fill in this part)

0313793.2

16 JUN 2003

3. Full name, address and postcode of the or of each applicant (underline all surnames)

John McGavigan Limited
111 Westerhill Road
Westerhill Business Park
Bishopbriggs
Glasgow
G64 2QR

Patents ADP number (if you know it)

7340698002

If the applicant is a corporate body, give the country/state of its incorporation

UK

4. Title of the invention

Improvements in and Relating to
Display Devices

5. Name of your agent (if you have one)

Cruikshank & Fairweather

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

19 Royal Exchange Square
Glasgow
G1 3AE

Patents ADP number (if you know it)

547002 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country	Priority application number (if you know it)	Date of filing (day / month / year)
GB	02 18 088.3	3/08/2002

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing (day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d)

Yes

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 21

Claim(s) 15

Abstract 1

Drawing(s) 7

only 1/2

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77) 1

Request for preliminary examination and search (Patents Form 9/77) 1

Request for substantive examination (Patents Form 10/77) 1

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

Date

Cruikshank & Fairweather

13/6/73

12. Name and daytime telephone number of person to contact in the United Kingdom Dr David Moreland 0141-221 5767

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

IMPROVEMENTS IN AND RELATING TO DISPLAY DEVICES

FIELD OF INVENTION

The present invention relates to an improved sheet form member or "applique" for use, for example, as a display, decorative panel or moulding, and more particularly, though not exclusively, to a sheet form member or applique having at least one integrally formed upstanding portion or "rim", for example, for use in a facia, instrument panel, or dial of an automotive vehicle.

BACKGROUND TO INVENTION

Planar appliques are used for displaying information and for providing added aesthetic appeal to facias of automotive vehicles. For example, such appliques are used as speedometers, rev. counters or the like.

A feature that has been added to instrumentation facias for reasons of aesthetic appeal, are chrome or mirror like rings, which form a rim that surrounds an instrumentation gauge. Typically such rims are provided for the speedometer and engine speed or rev. counter gauges.

A known method of creating such instrumentation facias, having rims, is to mount a separately formed rim or rims on a substantially planar applique. Individually moulded rims are mounted to the applique by means of

ultrasonic welding or heat welding. The applique is typically a flat polycarbonate sheet which may have printing thereon. Each of the individually moulded rims ~~is typically formed from an ABS (acrylonitrile butadiene~~
5 styrene) plastic, which is in turn exposed to a vacuum metalisation process in order to give each rim a chrome or mirror like effect.

The process of vacuum metalisation has the disadvantages of having a high fall out rate, as well
10 being environmentally unfriendly. In addition, the process of mounting the rims to the applique has the disadvantage of requiring additional manufacturing steps and time, which ultimately leads to higher production costs. Particularly, careful alignment of the applique
15 and rims is required.

It is an object of at least one embodiment of at least one aspect of the present invention to obviate or at least mitigate the aforementioned problems of the prior art.

20

SUMMARY OF INVENTION

According to a first aspect of the present invention there is provided a sheet form member or applique having at least one portion integrally formed thereon, said
25 portion having a height of at least 4 mm from a surface of the sheet form member.

Provision of a sheet form member having an upstanding portion integrally formed thereon eliminates the need to have individually formed rims affixed to the sheet form member, thereby reducing the number of manufacturing assembly steps required and the associated costs involved therewith.

The sheet form member may be adapted for use as a display panel or decorative panel, for example, for an instrumentation panel of an automotive vehicle.

Preferably, the height of the portion formed is between about 4 mm and 9 mm.

More preferably the portion height may be between about 4 mm and 7.5 mm.

In one embodiment the portion height may be around 6.5 mm, and in another embodiment around 7.5 mm.

The portion may be upstanding from a front surface of the sheet form member, and may be continuous, that is to say, form a closed shape. In such case the portion may be termed a "rim" or "ring".

The closed shape may be substantially circular, oval, elliptical or the like or a segmented circle, oval or ellipse. The shapes may be selected from those generally used for display gauges of a facia or instrument panel of an automotive vehicle.

Preferably the portion comprises a first wall, a second wall, and a top part and preferably has an open base part.

-----~~Preferably the base part of the portion has a width~~-----
5 from an outside of the second wall to an inside of the first wall in the region of 5 mm to 9 mm.

The portion may project from a substantially planar surface of the sheet form member.

Preferably the portion circumscribes an area of said
10 planar surface.

Preferably the first wall is convex in shape when viewed from a front of the sheet form member. The first wall of said portion may comprise part of a circle having a radius of between about 10 mm and 20 mm.

15 Preferably the second wall of said portion may be substantially vertical.

The second wall may be inclined at a shallow angle to the top part of the portion.

Preferably the top part is angled, the first wall
20 being higher than the second wall and the top portion comprising part of a circle having a radius of about 0.5 mm.

In a preferred embodiment there are provided two rims extending from the front surface of the sheet form member.
25 One rim may be provided for a speedometer gauge, whilst

the other rim may be provided for an engine speed (rev) counter.

The sheet form member may be provided with a pressure sensitive adhesive coated on a second or rear surface, e.g. to aid with mounting of the sheet form member onto the backing part. Alternatively, the sheet form member may be mounted to the backing part by way of clip fittings.

Preferably a spacing between outside walls of each of the two rims is about 45 mm to 50 mm.

Preferably a planar portion of the sheet form member has a thickness of between 0.25 mm and 0.5 mm.

Preferably the applique is made substantially from a plastics material, e.g. polycarbonate. Alternatively the sheet form member may be made from a blend of polycarbonate and poly-butylene-terraphthalate (PBT) or from ABS.

The sheet form member may be printed with a substantially single colour of ink, e.g. black.

The at least one rim may be silver or chrome coloured, and may be provided with an aluminium resin coating, e.g. on an inner surface thereof.

The sheet form member may be provided with a printed design. The printed design, e.g. dial chaplets, may be created by printing on a first and second surface of the sheet form member.

The sheet form member may be a laminate, that is to say, comprise two or more layers laminated together.

According to a second aspect of the present invention there is provided a component for an automotive vehicle comprising a sheet form member according to the first aspect of the present invention.

5 The component may comprise an instrument or gauge assembly.

Preferably the component further comprises a rigid backing part having the sheet form member mounted thereto. The sheet form member may be moulded to the backing part.
10 Alternatively, the sheet form member may be glued or otherwise fixed to the backing part.

Preferably the backing part is made from a plastics material, e.g. polycarbonate or ABS.

The sheet form member may be provided with a pressure sensitive adhesive coated on a second or rear surface to aid with mounting of the sheet form member onto the backing part. Alternatively, the sheet form member may be mounted to the backing part by way of clip fittings.
15

According to a third aspect of the present invention there is provided an automotive vehicle including a sheet form member according to the first aspect of the present invention.
20

According to a fourth aspect of the present invention there is provided a method of forming a sheet form member according to the first aspect of the present invention the method comprising the steps of :
25

providing a substantially planar sheet; and
forming said portion on said substantially planar
sheet.

The portion may be formed by a forming process such as
5 "pressure forming". Pressure forming is a process
typically including heating the sheet form member, which
may be a planar sheet, such that the sheet is able to take
the form of a mould to which the sheet is applied.
Pressure forming can use a fluid, e.g. air or gas, pressure
10 to force the substrate into the mould by pushing or sucking
via increased or reduced pressure on one side of the sheet
such that the sheet takes the shape of the mould.

Alternatively the portion may be formed by a forming
process such as "match metal forming". Match metal
15 forming is a process of shaping a sheet by use of two
moulds between which a normally heated sheet member is
placed. One of the moulds is used to force the sheet into
the other mould such that the sheet may take a desired
form. It has been found that the process of match metal
20 forming has the added advantage of reducing the problem of
wrinkles being formed on the substantially planar sheet in
the vicinity around the portion:

In yet another alternative, the portion may be formed
by a forming process such as "cold forming". Cold forming
25 is a process of shaping a sheet into a desired form by

forcing a sheet material into the required shape by the use of a die, punch, mould or the like without the use of heat.

The substantially planar sheet may be made
-----substantially from a-plastics-material,--e.g. polycarbonate_____
5 or a mixture or blend thereof.

The substantially planar sheet may be a laminate. That is to say the substantially planar sheet may be made of a number of sheets layered and bonded or adhered together.

The substantially planar sheet may having printing on
10 first and second sides thereof.

Preferably the method includes the step of applying to an area of a second surface of the substantially planar sheet an ink, e.g. a chrome or silver coloured ink, e.g. an aluminium based ink resin, the area then being formed into
15 the portion.

According to a fifth aspect of the present invention there is provided a sheet form member or applique having an ink coating applied to a surface, e.g. an obverse surface thereof, a pigment of the ink of said ink coating being
20 dissolved in a high temperature resin base.

Herein by "high temperature" is meant that the resin has a softening temperature in the region of about 160°C and above, e.g. 200°C and above.

In one embodiment a high temperature resin base having
25 a softening temperature of about 205°C may be used.

The use of a high temperature resin based ink may provide an added advantage of producing a sheet form member that can be manipulated by a forming process to produce a raised portion coincident with the ink coating. This is
5 believed to be due to the elastic and high temperature resistant properties of such resin based inks.

Preferably the resin base for the coating is a dissolved plastics material. The plastics material may be a polycarbonate material.

10 Most preferably the plastics material is a copolycarbonate based on a combination of bisphenol A (4,4'-isopropylidenediphenol) and bisphenol TMC (trimethylenecyclohexane bisphenol).

Alternatively, and advantageously, the resin base is
15 acrylic cellulose acetate butyrate.

Preferably the plastics material is dissolved in a non-halogenated solvent such as toluene, tetrahydrofuran, ethyl acetate or butanone.

Providing a resin based ink, e.g. copolycarbonate,
20 that is soluble in non-halogenated solvents provides added ecological advantages when it comes to preparation of solutions or coatings and, more especially, the processing and application of these solutions or coatings.

Preferably the resin based ink contains a chrome
25 and/or aluminium pigment.

Preferably the pigment comprises particles or flakes having an average size in the range 5 microns to 55 microns or 2 mm to 4mm in diameter or length.

~~The ink coating may form a closed shape, and the~~
5 closed shape may be annular, oval or elliptical or the like, or segmented annular, oval, elliptical, or the like.

Preferably the closed shaped ink coating has a width of between about 4 mm to 8 mm between an inside and outside of said shape.

10 Preferably the sheet form member has a thickness of between 0.25 mm and 0.5 mm.

Preferably the sheet form member is made from substantially polycarbonate. Alternatively the applique is made from a blend of polycarbonate and poly-butylene-
15 terraphthalate (PBT).

The sheet form member may be provided with a printed design. The printed design may include first and second surface printing.

The sheet form member may be provided with at least
20 one portion integrally formed thereon, said portion having a raised height of at least 4 mm from the obverse surface of said sheet form member.

Preferably the sheet form member has at least two portions formed thereon, at least one and preferably all of
25 said portions having a raised height of at least 4 mm from the obverse surface of said sheet.

Preferably said ink coating is substantially coincident with said portion.

According to a sixth aspect of the present invention there is provided a sheet form member or applique having an ink coating applied to a surface, e.g. an obverse surface thereof, a pigment of the ink of said ink coating being dissolved in an acrylic cellulose acetate butyrate resin base.

Providing a resin based acrylic that is soluble in non-halogenated solvents provides added ecological advantages when it comes to preparation of solutions or coatings and, more especially, the processing and application of these solutions or coatings.

Preferably the pigment comprises particles or flakes having an average size in the range 5 to 55 microns in diameter or length.

According to a seventh aspect of the present invention there is provided a component for an automotive vehicle including a sheet form member according to the fifth or sixth aspects of the present invention.

Preferably the component further comprises a rigid backing part having the sheet form member moulded thereto. Alternatively, the sheet form member may be glued or otherwise adhered to the backing part.

Preferably the backing part may be made from a plastics material, e.g. polycarbonate or ABS.

According to an eighth aspect of the present invention there is provided an automotive vehicle including a sheet form member according to the fifth or sixth aspects of the present invention.

5 According to a ninth aspect of the present invention there is provided a method of providing a sheet form member according to the fifth or sixth aspect, the method comprising the steps of:

10 providing a substantially planar sheet; and
 applying an ink coating thereto.

The ink coating may be applied by screen printing, pad printing, or similar technique.

The sheet used may be of a substantially plastics material, e.g. polycarbonate or a blend thereof.

15 The planar sheet may be printed on first and second sides of said sheet.

20 The method may include the step of producing a laminated sheet form member by laminating a further planar sheet form member, e.g. of polycarbonate, to a reverse side of said sheet form member.

The method may further include the step of forming at least one portion integrally on the sheet form member, said portion preferably having a raised height of at least 4 mm from the obverse surface of said sheet form member.

25 Preferably the at least one portion is substantially coincident with said ink coating.

Preferably the at least one portion is formed by a forming process such as match metal forming, high pressure forming or cold forming.

5 **BRIEF DESCRIPTION OF DRAWINGS**

Embodiments of the present invention will now be described, by way of example only, and with reference to the accompanying diagrams, which are:

10 **Figure 1** an isometric view of a sheet form member in accordance with a first embodiment of the present invention;

Figure 2 a plan view of the sheet form member of Figure 1;

15 **Figure 3** a side view of the sheet form member of Figure 1;

Figure 4 an enlarged side view of a portion of the sheet form member of Figure 1;

Figure 5 a cross-sectional side view along line A-A of the sheet form member of Figure 2;

20 **Figure 6** an isometric view of a component part in accordance with the present invention;

25 **Figure 7** schematic illustrations of steps involved in a first process of producing a formed sheet form member of Figure 1 in accordance with the present invention;

Figure 8 schematic illustrations showing steps involved in a second process of producing a formed sheet form member of Figure 1 in accordance with the present invention;

Figures 9(a) and 9(b) isometric and side views, respectively, of a sheet form member in accordance with of the present invention prior to forming;

Figure 10 a schematic illustration of a process of applying an ink coating to a reverse side of a formed sheet form member in accordance with the present invention;

Figure 11 schematic illustrations of process steps of creating a formed sheet form member having printing on a obverse and reverse side of a raised portion in accordance with the present invention; and

Figure 12 a schematic illustration showing steps involved in a third process producing a formed sheet form member in accordance with the present invention.

DETAILED DESCRIPTION OF DRAWINGS

Referring initially to Figure 1, there is provided a sheet form member or "applique", generally designated by reference numeral 10, according to a first embodiment of the present invention.

The sheet form member 10 has two upstanding portions or rims 12 integrally formed thereon, each upstanding

portion 12 having a height 14 which is greater than 4 mm, and, in this embodiment, around 6.5 mm, or alternatively 7.5 mm, above a front surface 16 of the sheet form member 10.

5 In this embodiment, the upstanding portions 12 are continuous, forming a circular closed shape ring on the front surface 16 of the sheet form member 10, for use as a decorative panel, for example, for an instrumentable panel of an automotive vehicle. The raised portions 12 may
10 alternatively be of any other shape generally used for the surround that outlines display gauges of automotive vehicles.

Referring now to Figures 2 and 3, the sheet form member 10 has printing on the front surface 16 and/or a
15 reverse surface 18. The printing in this instance corresponding to data relating to engine speed (rev) counter and speed of vehicle.

The sheet form member 10 is made of a polycarbonate plastics material which is about 0.375 mm thick. The sheet
20 form member 10 is, therefore, pliable such that it may take the shape of a surface which is not completely flat and to which the sheet form member 10 is affixed in use.

A reverse surface 18 of the sheet form member 10 can be coated with a pressure sensitive adhesive in order that
25 the sheet form member 10 can be attached to a backing part 19 so as to form a component 40 that is used to create the

facia or the instrument panel of an automotive vehicle, as shown in Figure 6.

Rings 20, 22 formed by the upstanding portions 12 are spaced apart such that outside walls of each of the two rings 20, 22 are about 45 mm apart.

In addition, the surfaces 16, 18 of the sheet form member 10 form a substantially flat planar surface, a portion of which planar surface is surrounded by the rings 20, 22 which typically have a radius of about 4.5 mm to 55 mm, e.g. 51 mm.

Referring now to Figure 4, there is shown detail of the raised or upright portion 12. It can be seen that the upright portion 12 comprises a first wall 24, a second wall 26, a top part 28 and has an open base 30. In this embodiment the base 30 has a width from the inside of the first wall 24 to the outside of the second wall 26 of typically 6.5 mm to 7.00 mm, e.g. 6.8 mm.

In addition, the first wall 25 is convex in shape when viewed from a front of the sheet form member 10, the first wall 24 having a radius of about 10 mm to 15 mm, e.g. 13 mm.

The second wall 26 of the upright portion 12 is substantially vertical having only a shallow incline to the top part 28, creating an angle of about 92° between the first surface 16 of the sheet form member 12 and the second wall 26. The top part 28 is also angled, the first wall

24 being slightly higher than the second wall 26. In addition, the top portion 28 has a radius of typically 0.4 mm to 0.6 mm, e.g. 0.5 mm.

Referring now to Figure 6, there is shown a component part 40 for an automotive vehicle according to the present invention. The component part 40 comprises a sheet form member 10 according to the first embodiment of the present invention, wherein the sheet form member 10 is mounted to a rigid backing piece 19.

Referring next to Figure 7, there is illustrated a method of forming a sheet form member 10 as shown in Figure 1 according to the present invention. The steps involved in producing the sheet form member 10 are to provide a substantially planar sheet 10 which can be a polycarbonate substrate 46. A design is then applied to the substrate 46 by first surface and/or second surface (front surface 16 and reverse surface 18) printing. The next step can then involve applying a hard or protective coat layer 48 to protect the ink design laid down on the substrate 46.

When the substrate 46 is ready to be shaped, that is to say have upstanding portions 47 (12) created in the substrate 46. The substrate 46 is exposed to a match metal forming process which involves heating the substrate 46 and shaping or forming the substrate 46 by use of two dies 49, 50 between which the substrate 46 is sandwiched. Alternatively a high pressure forming process or cold

forming process may be used. The resultant shaped substrate or formed applique 52 may then be moulded or affixed to a backing piece or component part 54 to which

the design and shape of the formed applique is required, by

5. use of a moulding tool 56.

In one implementation the raised portions 12 are coated with an ink having a chrome aluminium pigment giving the raised portions 12 a mirror type finish.

The height of the upstanding portions 12 can typically be between 4 mm and 9 mm. The base 30 can be between 5 to 9 mm and the radius of the first wall 24 can be between 10 mm to 20 mm.

In an alternative implementation, the substrate 46 from which the sheet form member 10, is created can be a laminate and formed from a process as shown in Figure 8. After printing has been applied to the relevant surfaces of a first substrate layer 58 an adhesion promoter 60 is applied to a reverse surface 62 of the substrate 58 a second substrate layer 64 is applied to the reverse surface of the first substrate layer 58 to create a laminate 66. The laminate 66 is then passed through heated pressure rollers and the resultant laminated sheet 66 is exposed to the match metal forming or high pressure forming process so as to create the required shape.

25 Providing a sheet form member 10, having upstanding portions 12 integrally formed thereon eliminates the need

to create individually formed rims and then affix the rims to the sheet form member 10, thereby reducing the number of manufacturing assembly steps and the associated costs involved therewith. In addition, the process of match

5 metal forming has the added advantage of alleviating or reducing the problem of wrinkles being formed on the planar sheet in the vicinity around the first and/or second walls 24,26 of the upstanding portion 12.

Referring next to Figures 9(a) and (b), there is shown
10 a sheet 70 for use in forming sheet form member 10 of Figure 1 prior to forming of the portions 12. The member 70 has an ink coating 72 applied to a front obverse surface 74 thereof. The ink coating 72 is a high temperature resin based ink which is plastics based, and typically
15 copolycarbonate based, the copolycarbonate comprising a combination of bisphenol A and a bisphenol, e.g. bisphenol TMC. In an alternative and advantageous implementation the resin base is acrylic cellulose acetate butyrate.

The ratio of the bisphenol components determines the
20 properties of heat resistance, or glass transition temperature which increase with the bisphenol TMC content. In addition, as the bisphenol TMC content of the copolycarbonate increases so does its solubility in non-halogenated solvents, due to the more pronounced aliphatic
25 nature of the copolycarbonate.

The ink coating 72 is, therefore, made from a copolycarbonate material dissolved in a non-halogenated solvent having a chrome aluminium pigment added thereto.

----- The ink coating 72 is applied to the sheet form member
5 70 such that it creates an annular design closed shape having a width of typically 8 mm.

The sheet form member 70 can also have a design applied by first and/or second surface printing.

In one embodiment the sheet form member 70, which has
10 the ink coating 72 applied to it, may be subjected, e.g. to a match metal or other forming process, as described herein above, in order to create upstanding portions that are coincident with the ink coating 72. That is to say, the sheet form member 70 has chrome like rims integrally formed
15 therewith.

The application of an ink coating 72 of a high temperature resin based ink to a planar sheet form member provides the added advantage of producing a sheet form member that can be manipulated by a forming process, such
20 as match metal or other forming, to produce raised portions coincident with the ink coating, due to the elastic and high temperature resistance of such resin based inks.

To increase the opacity of the mirror like rims, after the sheet form member has been subjected to the match metal
25 forming, high pressure or cold forming process, it may be required to apply an additional coat of ink to a reverse

side 76 of the formed sheet form member 70. This additional coat of ink can be applied either by a tampon or a pad printing process as shown in Figure 10 or alternatively by masking or spraying. The printing process involves the use of a suitable shaped applicator 5 78, which in this embodiment would be annular and made of a material such as silicon rubber, in order to apply the additional coat of paint. The additional coat of ink can be the same ink used on the obverse surface 74 of the sheet 10 form member 70. Alternatively, the additional coat of ink may be a black or white ink used to increase the opacity of the chrome like rims when viewed from the obverse side.

It will be appreciated that various modifications may be made to the foregoing without departing from the scope 15 of the invention, for example, the sheet form member 70 may be laminated as described herein above. In addition, the step of applying the additional coat of ink can be applied on the reverse side of the laminated sheet before the match forming process is performed as shown in Figure 11. The 20 additional coat of ink being an opaque ink that mirrors the printing of the ink coating 72 on the obverse surface 74. Further other modifications may include forming the portion by way of a cold forming process as illustrated in Figure 12, or the use of an acrylic cellulose acetate butyrate 25 resin based ink as the ink coating, as mentioned above.

CLAIMS

1. An automotive vehicle display panel, decorative panel
or appliqué comprising a sheet form member having at least
5 two portions integrally formed thereon, at least one of
said portions having a height of at least 4 mm from a
surface of the sheet form member.
2. An automotive vehicle display panel, decorative panel
10 or appliqué as claimed in claim 1, wherein the portions
project from a substantially planar surface of the sheet
form member.
3. An automotive vehicle display panel, decorative panel
15 or appliqué as claimed in claim 2, wherein each portion
circumscribes an area of said planar surface.
4. An automotive vehicle display panel, decorative panel
or appliqué as claimed in any preceding claim, wherein
20 there are provided two portions, and each has a height of
at least 4 mm from the surface of the sheet form member.
5. An automotive vehicle display panel, decorative panel
or applique as claimed in any preceding claim, wherein an
25 ink coating is applied to a surface, such as an obverse

surface thereof, a pigment of the ink of said ink coating being dissolved in a high temperature resin base.

5 6. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the height of at least one of the formed portions is between 4 mm and 9 mm.

10 7. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the height of at least one of the portions is between 4 mm and 7.5 mm.

15 8. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the height of at least one of the portions is around 6.5 mm.

20 9. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein each portion is upstanding from a front surface of the sheet form member and optionally each is continuous, forming a closed shape.

25 10. An automotive vehicle display panel, decorative panel or applique as claimed in claim 9, wherein the/each closed shape is selected from one of: substantially circular,

oval, elliptical or the like or a segmented circle, oval or ellipse.

11. ~~An automotive vehicle display panel, decorative panel~~
5 or applique as claimed in claim 9, wherein the closed shape is selected from those generally used for display gauges of a facia or instrument panel or control panel of an automotive vehicle.
- 10 12. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein each portion comprises a first wall, a second wall, a top part and an open base part.
- 15 13. An automotive vehicle display panel, decorative panel or applique as claimed in claim 12, wherein the base part of the portion has a width from an outside of the second wall to an inside of the first wall in the region of 5 mm to 9 mm.
- 20 14. An automotive vehicle display panel, decorative panel or applique as claimed in either of claims 12 or 13, wherein the first wall is convex in shape when viewed from a front of the sheet form member.

15. An automotive vehicle display panel, decorative panel or applique as claimed in any of claims 12 to 14, wherein the first wall of said portion comprises part of a circle having a radius of between about 10 mm and 20 mm.

5

16. An automotive vehicle display panel, decorative panel or applique as claimed in any of claims 12 to 15, wherein the second wall of said portion is substantially vertical.

10

17. An automotive vehicle display panel, decorative panel or applique as claimed in any of claims 12 to 15, wherein the second wall is inclined at a shallow angle to the top part of the portion.

15

18. An automotive vehicle display panel, decorative panel or applique as claimed in any of claims 12 to 17, wherein the top part is angled, the first wall being higher than the second wall and the top portion comprising part of a circle having a radius of about 0.5 mm.

20

19. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the sheet form member is provided with a pressure sensitive adhesive coated on a second or rear surface.

25

20. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein a spacing between outside walls of each of the portions is about 45 mm to 50 mm.

5

21. An automotive vehicle display panel, decorative panel or applique as claimed in any of claims 2 to 21, wherein the planar portion of the sheet form member has a thickness of between 0.25 mm and 0.5 mm.

10

22. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the sheet form member is made substantially from a plastics material such as polycarbonate.

15

23. An automotive vehicle display panel, decorative panel or applique as claimed in any of claims 1 to 22, wherein the sheet form member is made from a blend of polycarbonate and poly-butylene-terraphthalate (PBT) or from ABS.

20

24. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the sheet form member is printed with a substantially single colour of ink such as black.

25

25. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein at least one of the portions is silver or chrome coloured.
- 5 26. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the sheet form member is provided with an aluminium resin coating optionally on an inner surface thereof.
- 10 27. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the sheet form member is provided with a printed design.
- 15 28. An automotive vehicle display panel, decorative panel or applique as claimed in claim 27, wherein the printed design is created by printing on a first and second surface of the sheet form member.
- 20 29. An automotive vehicle display panel, decorative panel or applique as claimed in any preceding claim, wherein the sheet form member is a laminate comprising two or more layers laminated together.
- 25 30. A component for an automotive vehicle comprising an automotive vehicle display panel, decorative panel or applique according to any of claims 1 to 29.

31. A component as claimed in claim 31, wherein the component comprises an instrument, gauge or control assembly for an automotive vehicle. -----

5

32. A component as claimed in either of claims 30 or 31, wherein the component further comprises a rigid backing part having the sheet form member mounted thereto.

10

33. A component as claimed in claim 32, wherein the sheet form member is moulded to the backing part.

15

34. A component as claimed in claim 32, wherein the sheet form member is glued, clipped, or otherwise fixed to the backing part.

20

35. A component as claimed in any of claims 32 to 34, wherein the backing part is made from a plastics material, such as polycarbonate or ABS.

25

36. An automotive vehicle including an automotive vehicle display panel, decorative panel or applique according to any of claims 1 to 29.

37. A method of forming a sheet form member according to any of claims 1 to 29, the method comprising the steps of :

providing a substantially planar sheet; and
forming the at least two portions on said
substantially planar sheet.

5 38. A method as claimed in claim 37, wherein the portions
are formed by a forming process comprising pressure
forming.

39. A method as claimed in claim 37, wherein the portions
10 are formed by a forming process comprising match metal
forming.

40. A method as claimed in claim 37, wherein the portions
are formed by a forming process comprising cold forming.

15 41. A method as claimed in any of claim 38 to 40, wherein
the substantially planar sheet is made substantially from a
plastics material, such as polycarbonate or a mixture or
blend thereof.

20 42. A method as claimed in any of claims 38 to 41, wherein
the substantially planar sheet is a laminate.

25 43. A method as claimed in any of claims 38 to 42, wherein
the substantially planar sheet is printed on first and
second sides thereof.

44. A method as claimed in any of claims 38 to 43, wherein the method includes the step of applying to at least one ~~area of a second surface of the substantially planar sheet~~ an ink, such as a chrome or silver coloured ink, such as an aluminium based ink resin, the at least one area then being formed into one of the portions.

45. A sheet form member having an ink coating applied to a surface, such as an obverse surface thereof, a pigment of the ink of said ink coating being dissolved in a high temperature resin base.

46. A sheet form member as claimed in either of claims 5 or 45, wherein the high temperature resin base has a softening temperature of above 160° and typically about 205°C.

47. A sheet form member as claimed in either of claims 5, 44 or 45, wherein the resin base for the coating is a dissolved plastics material or acrylic cellulose acetate butyrate.

48. A sheet form member as claimed in claims 47, wherein the plastics material is a polycarbonate material.

49. A sheet form member as claimed in claims 47, wherein the plastic material is a copolycarbonate which is a combination of bisphenol A (4,4'-isopropylidenediphenol) and bisphenol TMC (trimethylenecyclohexane bisphenol).

5

50. A sheet form member as claimed in any of claims 47 to 49, wherein the plastics material is dissolved in a non-halogenated solvent such as toluene, tetrahydrofuran, ethyl acetate or butanone.

10

51. A sheet form member as claimed in any of claims 5 or 45 to 50, wherein the resin based ink contains a chrome and/or aluminium pigment.

15

52. A sheet form member as claimed in claims 51, wherein the pigment comprises particles or flakes having an average size in the range 5 microns to 55 microns in diameter or length.

20

53. A sheet form member as claimed in either of claims 5 or 45 to 52, wherein the ink coating forms a closed shape, the closed shape optionally being annular, oval or elliptical.

25

54. A sheet form member as claimed in any of claims 5 or 45 to 53, wherein the closed shape ink coating has a width

of between about 4 mm to 8 mm between an inside and outside of said shape.

55.- A sheet form member as claimed in any of claims 5 or 45 to 54, wherein the sheet form member has a thickness of between 0.25 mm and 0.5 mm.

56. A sheet form member as claimed in any of claims 5 or 45 to 55, wherein the sheet form member is made from substantially from polycarbonate.

57. A sheet form member as claimed in any of claims 5 or 45 to 55, wherein the sheet form member is made from a blend of polycarbonate and poly-butylene-terraphthalate (PBT).

58. A sheet form member as claimed in any of claims 5 or 45 to 57, wherein the sheet form member is provided with a printed design.

59. A sheet form member as claimed in claims 58, wherein the printed design includes first and second surface printing.

60. A sheet form member as claimed in any of claims 5 or 45 to 59, wherein the sheet form member is provided with at

least two portions integrally formed thereon, at least one of said portions having a raised height of at least 4 mm from the obverse surface of said sheet form member.

5 61. A sheet form member as claimed in claim 60, wherein the ink coating is substantially coincident with said portion.

10 62. An automotive vehicle display panel, decorative panel or applique comprising a sheet form member having an ink coating applied to a surface, such as an obverse surface thereof, a pigment of the ink of said ink coating being dissolved in an acrylic cellulose acetate butyrate resin base.

15

63. An automotive vehicle display panel, decorative panel or applique as claimed in claim 66, wherein the pigment comprises particles or flakes having an average size in the range 5 microns to 55 microns in diameter or length.

20

64. A component for an automotive vehicle including a sheet form member as claimed in either of claims 45 or 62.

25 65. A component as claimed in claim 64, wherein the component further comprises a substantially rigid backing part having the sheet form member moulded thereto.

66. A component as claimed in claim 64, wherein the sheet form member is glued, clipped or otherwise adhered to the rigid backing part.

5

67. A component as claimed in either of claims 65 or 66, wherein the backing part is made from a plastics material, such as polycarbonate or ABS.

10 68. An automotive vehicle including a sheet form member as claimed in either of claims 45 or 62.

69. A method of providing a sheet form member as claimed in either of claims 45 or 62, the method comprising the steps of:

15 providing a substantially planar sheet; and
applying an ink coating thereto.

70. A method as claimed in claim 69, wherein the ink coating is applied by screen printing or pad printing.

20

71. A method as claimed in either of claims 69 or 70, wherein the sheet is of a substantially plastics material, such as polycarbonate or a blend thereof.

25

72. A method as claimed in any of claims 69 to 71, wherein the planar sheet is printed on first and second sides of said sheet.

5 73. A method as claimed in any of claims 69 to 72, wherein the method includes the step of producing a laminated sheet form member by laminating a further planar sheet form member, to a reverse side of said sheet form member.

10 74. A method as claimed in any of claims 69 to 73, wherein the method further includes the step of forming at least two portions integrally on the sheet form member, at least one portion of said portions having a raised height of at least 4 mm from an obverse surface of said sheet form member.
15

75. A method as claimed in claim 74, wherein the at least two portions are substantially coincident with said ink coating.

20 76. A method as claimed in any of claims 74 or 75, wherein the at least two portions are formed by a forming process selected from match metal forming, high pressure forming or cold forming.

25

77. A sheet form member having at least two portions integrally formed thereon as hereinbefore described with reference to the accompanying drawings.

5 78. A method of manufacturing a sheet form member having at least two portions integrally formed thereon as hereinbefore described with reference to the accompanying drawings.

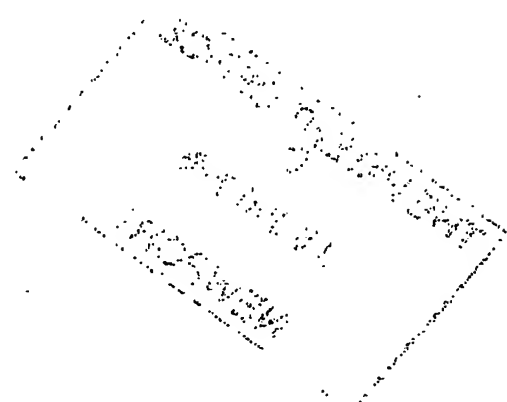
10 79. A sheet form member having an ink coating applied to a surface thereof as hereinbefore described with reference to the accompanying drawings.

15 80. A method of manufacturing a sheet form member having an ink coating applied to a surface thereof as hereinbefore described with reference to the accompanying drawings.

20 81. A sheet form member or applique having at least one portion integrally formed thereon, said portion having a height of at least 4 mm from a surface of the sheet form member.

ABSTRACTIMPROVEMENTS IN AND RELATING TO DISPLAY DEVICES

5 There is disclosed an improved sheet form member or
applique (10) which finds particular use as an automotive
vehicle display panel or instrument panel. The sheet form
member (10) comprises at least one, and preferably two,
upstanding portions or rims (12) integrally formed thereon,
10 the/each portion (12) having a height of at least 4 mm from
a surface of the sheet form member (10).



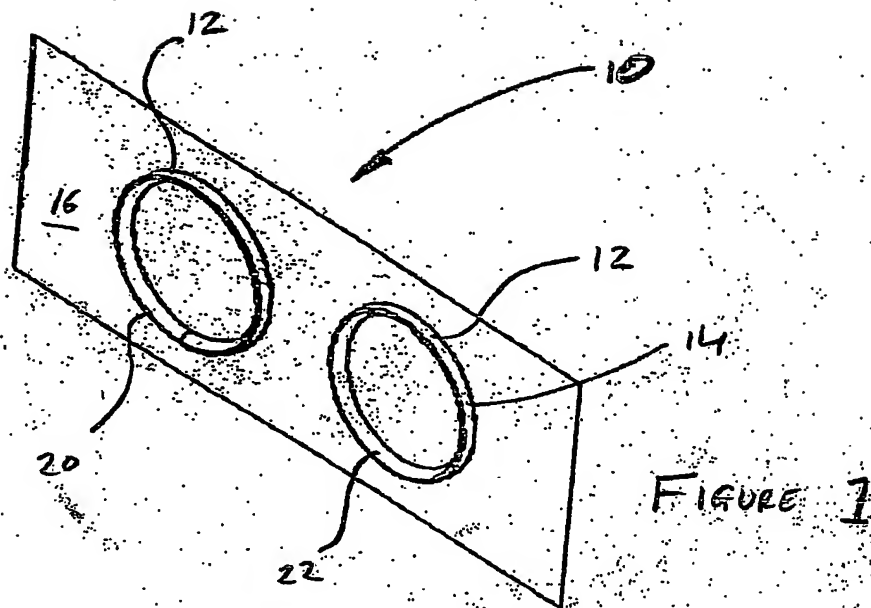


FIGURE 1

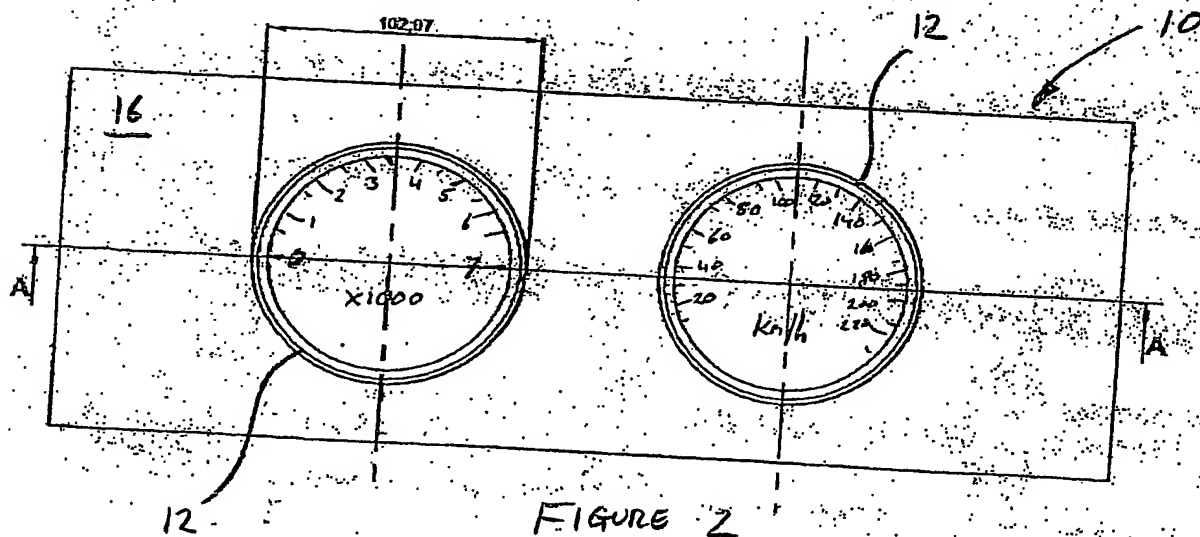


FIGURE 2

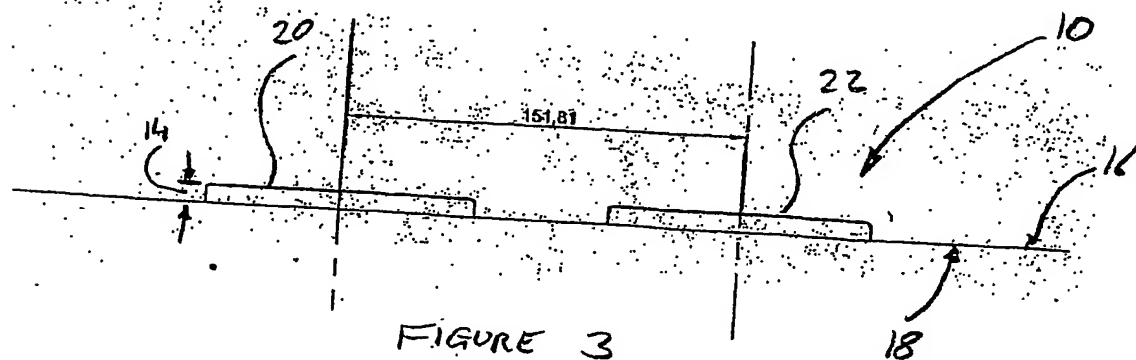
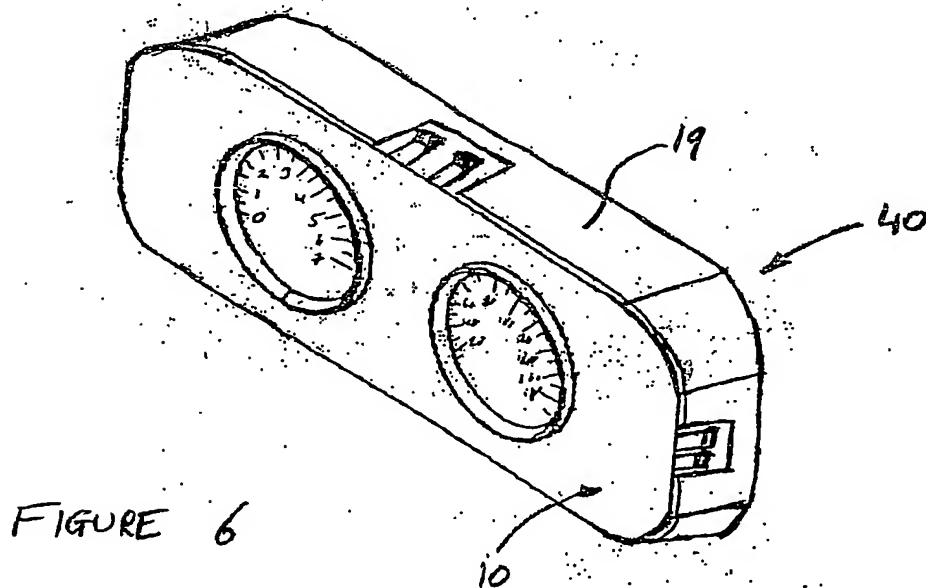
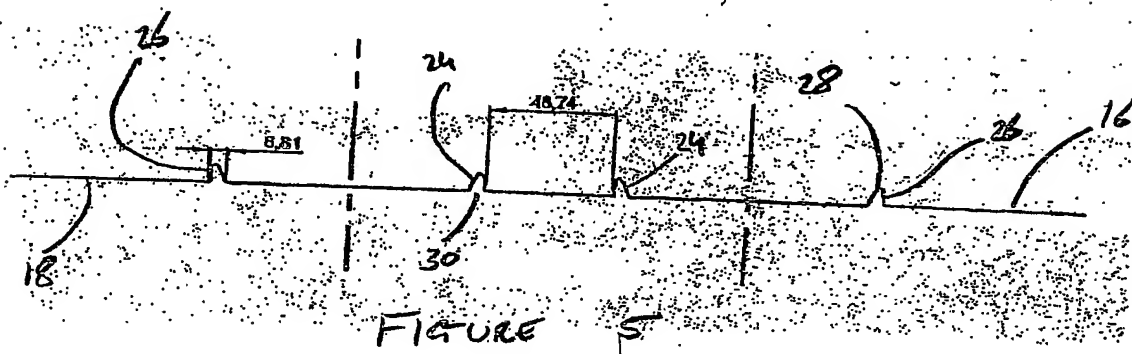
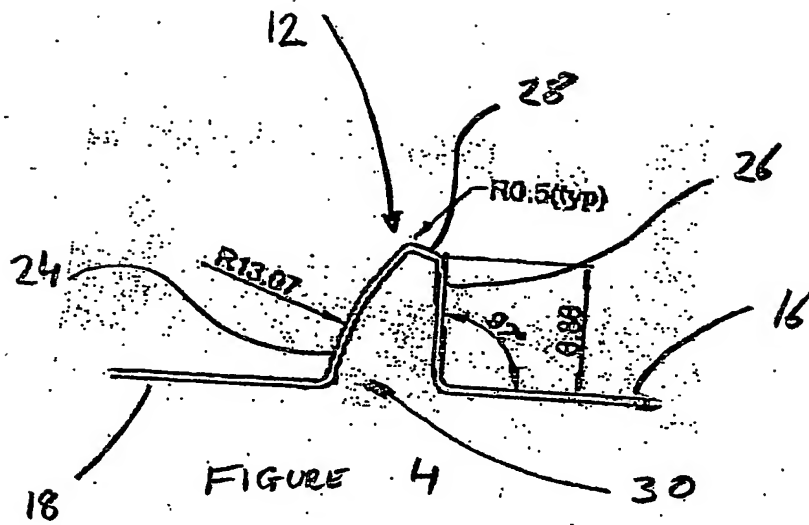


FIGURE 3

2/7



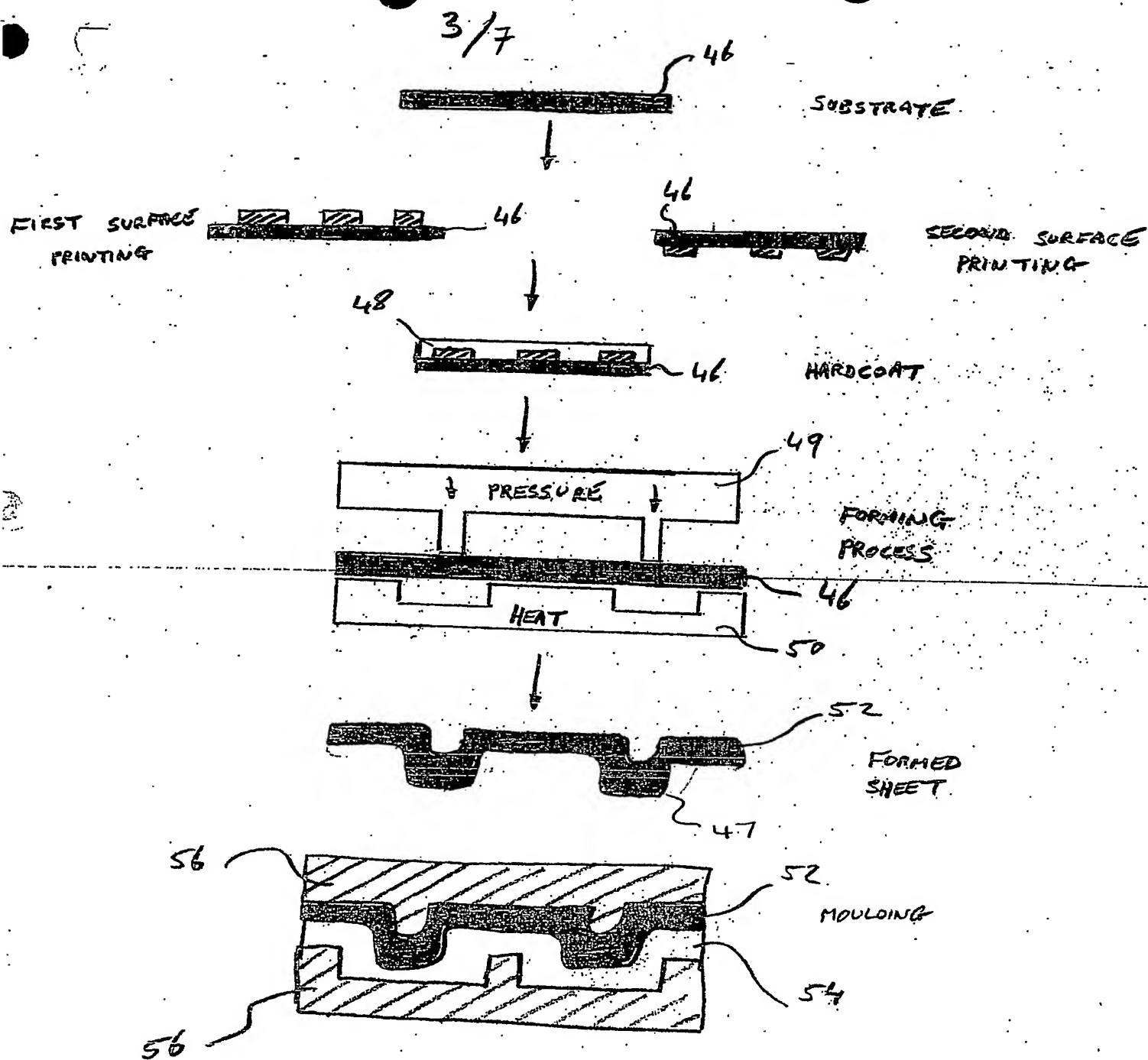


FIG 7

4/7

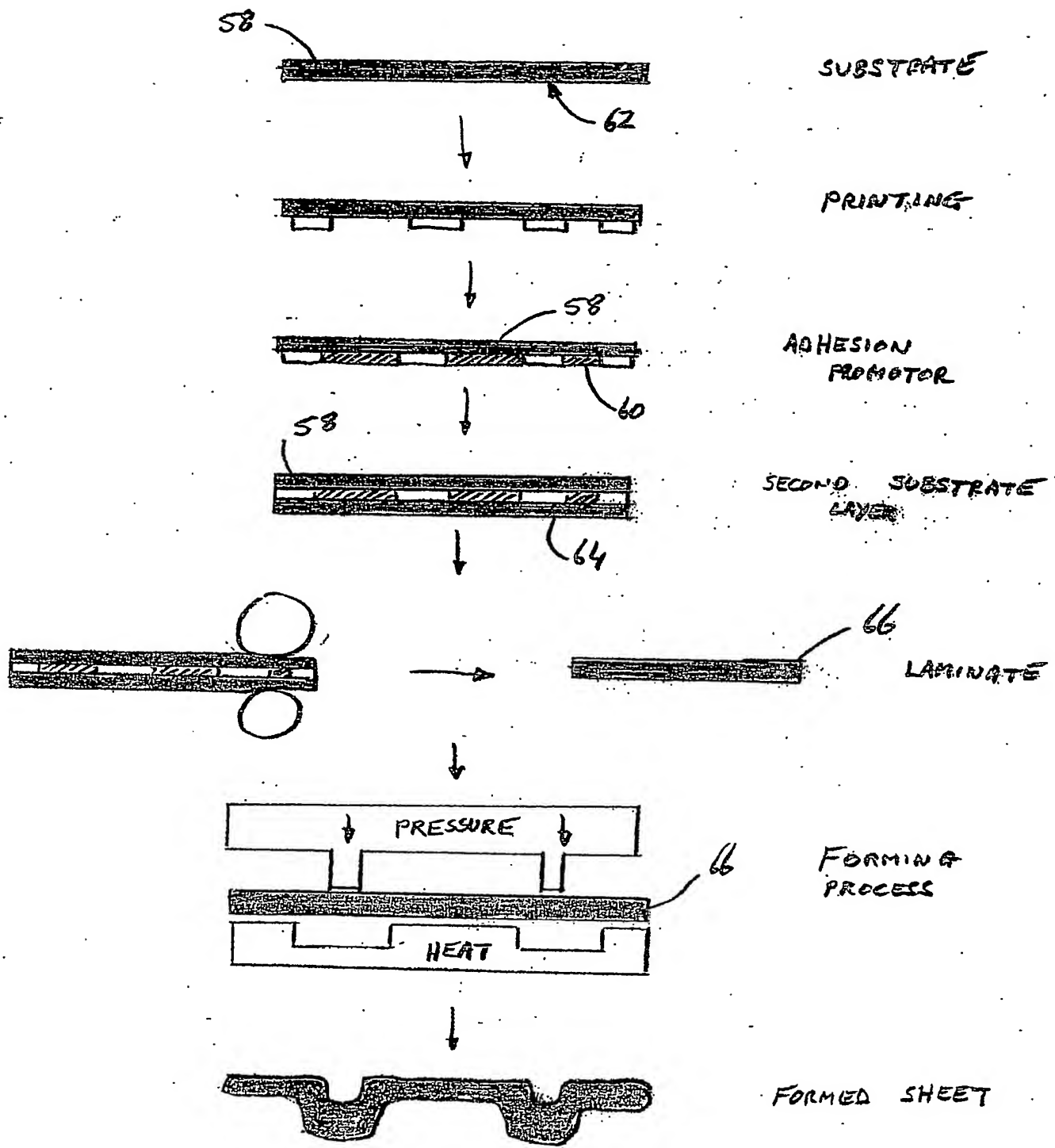
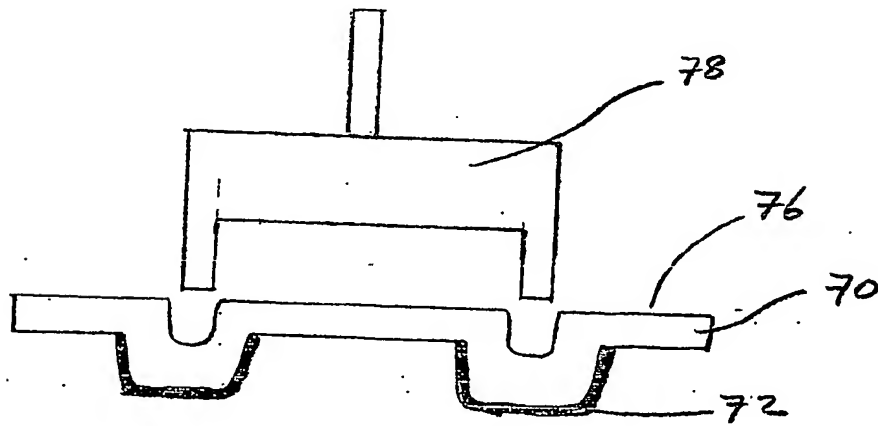
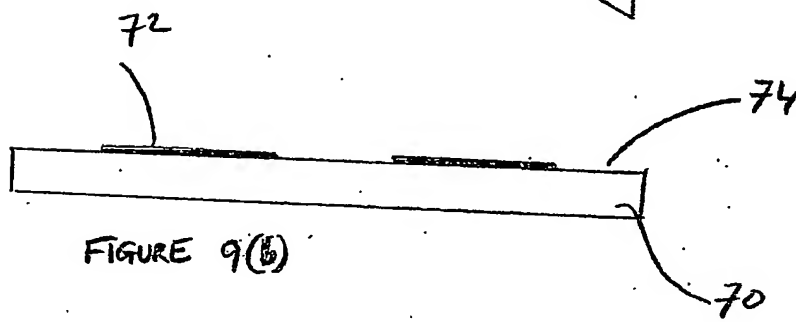
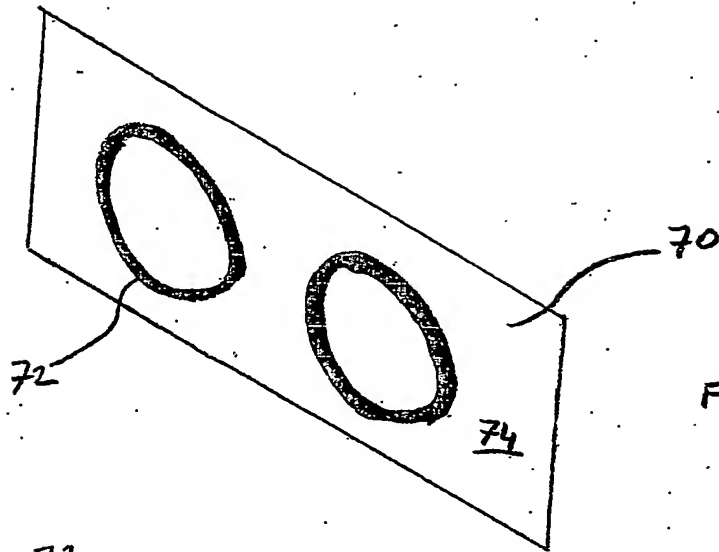
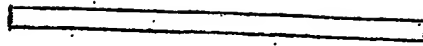


FIGURE 8

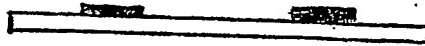
5/7



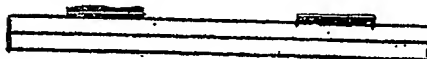
6/7



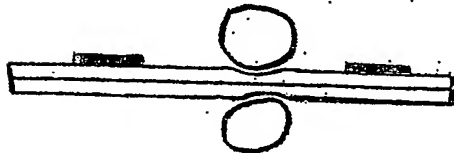
SUBSTRATE



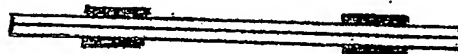
PRINTING



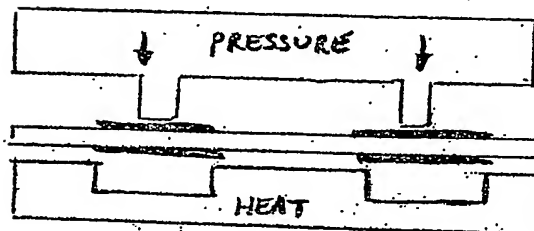
SECOND SUBSTRATE
LAYER



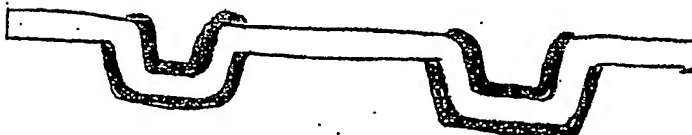
LAMINATE



PRINTING



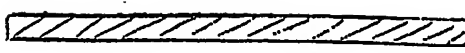
FORMING
PROCESS



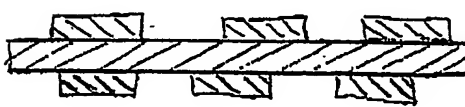
FORMED
SHEET

FIGURE 11

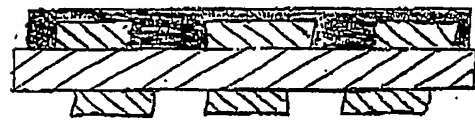
7/7



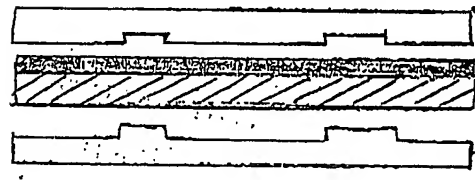
SUBSTRATE



PRINTING OF PASTE
SECOND SURFACE



HARDCOAT



FORMING PROCESS



FORMED SHEET

FIG. 12

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.